

*REMARKS/ARGUMENTS**The Pending Claims*

Claims 198-223 currently are pending. Claims 198-215 and 218-223 currently are subject to examination. Claims 216 and 217 have been withdrawn in response to a restriction requirement. With respect to claims that have been withdrawn, upon allowance of the elected composition claims, Applicants request rejoinder of the withdrawn method claims dependent on, or which otherwise contain the limitations of, an allowed claim.

*Amendments to the Claims*

The claims have been amended to point out more particularly and claim more distinctly the invention. In particular, claims 198 has been amended to incorporate the subject matter of claim 202; whereas claim 206 has been amended to incorporate the subject matter of claim 209. In view of the amendment to claims 198 and 206, claims 200-202, 208, and 209 have been cancelled, and claim 203 has been amended. New claim 224 has been added as supported by the specification at, for example, at paragraphs 0045 and 0046. No new matter has been added by way of these amendments.

*Summary of the Office Action*

Claims 198-201, 203, 218, and 220 have been rejected under 35 U.S.C. § 102(e) as allegedly anticipated by U.S. Patent 6,710,366 (Lee et al.) (“the Lee patent”). Claims 202, 204-215, 219, and 221-223 have been rejected under 35 U.S.C. § 103(a) as allegedly obvious over the Lee patent in view of U.S. Patent 6,207,392 (Weiss et al.) (“the Weiss patent”) and U.S. Patent 6,846,565 (Korgel et al.) (“the Korgel patent”).

Reconsideration of these rejections is respectfully requested in view of the claim amendments and remarks herein.

*Discussion of Rejection Under 35 U.S.C. § 102(e)*

Claims 198-201, 203, 218, and 220 have been rejected as allegedly anticipated by the Lee patent. Claims 200 and 201 have been cancelled. Therefore, the anticipation rejection is addressed below with respect to pending claims 198, 199, 203, 218, and 220.

The Office alleges that the Lee patent describes a quantum dot with a continuous graded alloy of distinct core and shell materials in an “interface region,” wherein the center of the quantum dot is purely core material and the outer surface of the quantum dot is purely shell material, with a continuous transition of the materials in the interface region (see, Office Action dated June 22, 2009 at page 2).

Solely in an effort to advance prosecution of the present application, and not in acquiescence of the rejection, claim 198 has been amended to specify that the alloy comprises CdSeTe and has a molecular formula  $\text{CdSe}_{1-x}\text{Te}_x$ , the alloy comprises CdSSe and has a molecular formula  $\text{CdS}_{1-x}\text{Se}_x$ , the alloy comprises CdSTe and has a molecular formula  $\text{CdS}_{1-x}\text{Te}_x$ , the alloy comprises ZnSeTe and has a molecular formula  $\text{ZnSe}_{1-x}\text{Te}_x$ , the alloy comprises ZnCdTe and has a molecular formula  $\text{Zn}_{1-x}\text{Cd}_x\text{Te}$ , the alloy comprises CdHgS and has a molecular formula  $\text{Cd}_{1-x}\text{Hg}_x\text{S}$ , the alloy comprises HgCdTe and has a molecular formula  $\text{HgCdTe}$ , the alloy comprises InGaAs and has a molecular formula  $\text{InGaAs}$ , the alloy comprises GaAlAs and has a molecular formula  $\text{GaAlAs}$ , or the alloy comprises InGaN and has a molecular formula  $\text{InGaN}$ , wherein  $x$  is any fraction between 0 and 1. The Lee patent does not disclose or suggest the aforementioned alloys, much less a concentration-gradient quantum dot comprising the same, as recited in amended claim 198 and claims depending thereon. Moreover, the Office acknowledges that the Lee patent does not disclose or suggest a concentration-gradient quantum dot comprising the aforementioned alloys (see, Office Action dated June 22, 2009 at page 4). The Lee patent, therefore, does not disclose the invention as recited in pending claim 198, or claims 199, 203, 218, and 220 depending thereon, and the anticipation rejection should be withdrawn.

*Discussion of Rejection Under 35 U.S.C. § 103(a)*

Claims 202, 204-215, 219, and 221-223 have been rejected under 35 U.S.C. § 103(a) as allegedly obvious over the Lee patent in view of the Weiss patent and the Korgel patent. Claims 202, 208, and 209 have been cancelled. Therefore, the obviousness rejection is addressed below with respect to pending claims 202, 204-207, 210-215, 219, and 221-223.

The Lee patent discloses that “the interface region may be homogenous or inhomogenous and may comprise chemical characteristics that are graded between the core and shell materials such that a gradual or continuous transition is made between the core and

the shell” (see column 7, lines 25-29). However, Applicants note that the Lee patent provides only a vague description of the aforementioned quantum dot and, in particular, does not provide any direction or guidance that would enable one of ordinary skill in the art to make and use such a quantum dot. Moreover, methods of making and using a quantum dot having an interface region that is graded between the core and shell materials were not known to one of ordinary skill in the art at the time the Lee patent was filed.

In stark contrast to the vague disclosure of the Lee patent, the present application provides a detailed disclosure of the concentration-gradient quantum dot and the series of concentration-gradient quantum dots recited in the pending claims(see, e.g., paragraphs 0042-0052), as well as specific methods for producing and using the same (see, e.g., paragraphs 0012-0021, 0025, and 0026).

It is well established that where a process for making a compound is not developed until after the date of invention, the mere naming of a compound in a reference, without more, cannot constitute a description of the compound.” See, e.g., *In re Hoeksema*, 399 F.2d 269, 158 U.S.P.Q. 596 (C.C.P.A. 1968). The Lee patent does not teach, and therefore, does not enable, how to synthesize a concentration-gradient quantum dot. The Lee patent does not provide any generalized method steps or provide any specific examples directed to a quantum dot comprising a gradual or continuous transition between the core and the shell. Therefore, the disclosure of the Lee patent cannot be considered to disclose a concentration-gradient quantum dot, as recited in the pending claims, because the Lee patent, together with the state of the art at the time the Lee patent was filed, fails to enable one of ordinary skill in the art to make the referenced quantum dot.

In view of the foregoing, Applicants respectfully submit that the mere disclosure of a quantum dot comprising an interface region that *may be* graded between the core and shell materials such that a gradual or continuous transition is made between the core and the shell, in the absence of any direction or guidance as to how to prepare such a quantum dot, does not constitute a description of the claimed concentration-gradient quantum dot. In other words, because the Lee patent is not enabled for the basis for which it was relied upon by the Office, the Lee patent’s alleged disclosure of a concentration-gradient quantum dot is not prior art to the claimed invention.

The Weiss patent and the Korgel patent, either alone or in combination, do not compensate for the deficiencies of the Lee patent, as discussed in more detail below.

The Weiss patent discloses that the emission wavelength of a semiconductor nanocrystal can be selected by varying the composition of the nanocrystal alloy (see column 8, line 61, through column 9, line 11). The Office alleges that it would have been obvious for one of ordinary skill in the art to optimize the ratios of semiconductor alloys disclosed in the Lee patent in view of the teachings of the Weiss patent. However, the Weiss patent does not disclose or suggest a concentration-gradient quantum dot or series of concentration-gradient quantum dots wherein the concentration of the first semiconductor gradually increases from the core to the surface and the concentration of the second semiconductor gradually decreases from the core to the surface, as recited in independent claims 198 and 206, and claims depending thereon.

The Office relies on the Korgel patent for allegedly disclosing semiconductor nanoparticles that can be used in light emitting diodes. However, similar to the Weiss patent, the Korgel patent does not disclose or suggest a concentration-gradient quantum dot or series of concentration-gradient quantum dots as recited in the pending claims.

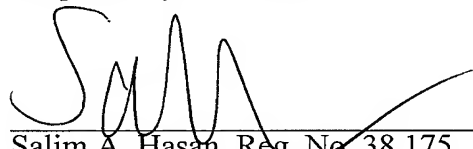
In view of the foregoing, even when the disclosures of the Lee, Weiss, and Korgel patents are considered together, there is no enabling disclosure of all of the features of the present invention. In particular, the Weiss and Korgel patents fail to remedy the deficiencies of the Lee patent inasmuch as none of these references provides an enabling disclosure of a concentration-gradient quantum dot or a series of concentration-gradient quantum dots wherein the concentration of the first semiconductor gradually increases from the core of the quantum dot to the surface of the quantum dot and the concentration of the second semiconductor gradually decreases from the core of the quantum dot to the surface of the quantum dot, as recited in the pending claims. Therefore, even if one of ordinary skill in the art were to combine the disclosure of the Lee, Weiss, and Korgel patents, one would not arrive at the present invention, as recited in the pending claims.

Accordingly, the obviousness rejections are improper and should be withdrawn.

*Conclusion*

Applicants respectfully submit that the patent application is in condition for allowance. If, in the opinion of the Examiner, a telephone conference would expedite the prosecution of the subject application, the Examiner is invited to call the undersigned attorney.

Respectfully submitted,

A handwritten signature in black ink, appearing to read 'Salim', with a long horizontal flourish extending to the right.

---

Salim A. Hasan, Reg. No. 38,175  
LEYDIG, VOIT & MAYER, LTD.  
Two Prudential Plaza, Suite 4900  
180 North Stetson Avenue  
Chicago, Illinois 60601-6731  
(312) 616-5600 (telephone)  
(312) 616-5700 (facsimile)

Date: September 22, 2009